

exhaust gas blow nozzle is opened at least in the liquid-including substance and in the vicinity of the surface of the liquid-including substance in the pool, and with at least one capturing zone that captures entrainment of the liquid-including substance and constitutes a contacting surface area between the exhaust gas and the liquid-including substance, and]

means for feeding water to the reaction zone device.

Please add the following new claims as claim 22 and claim 23.

--22. An apparatus according to claim 19, wherein the apparatus further comprising:

an after-treating device equipped with at least one water pool where at least one blow nozzle for the exhaust gas treated in the reaction zone is opened at least in the water and in the vicinity of surface of the water in the pool, and at least one after-treating zone that captures entrainment of the water, and

means for feeding water to the after-treating device and sending the water contacted with the exhaust gas in the after-treating device to the reaction zone device.--

--23. An apparatus according to claim 19, wherein the apparatus further comprising:

an after-treating device equipped with solid carbon.--

IN THE ABSTRACT

Line 1, delete "method and", and "therefor".

IN THE DRAWINGS

Please add a new drawing attached herewith as Fig 10.

R E M A R K S

Further and favorable reconsideration is respectfully requested in view of the following remarks.

Claim Rejections 35 U.S.C 102

Claims 1, 2, 4, 7, 13, 14, 16, 18, and 20 have been rejected under 35 U.S.C 102(e)

as being anticipated by Durand et al. (US Patent 5,965,481).

The examiner has suggested that Durand et al. discloses

A process for preparing a catalyst suitable for the treatment of exhaust gases from internal combustion engines.

An aqueous solution comprised of 50grams of barium carbonate and 400grams of a cerium nitrate solution(col. 9, lines 55-62), therefore, discloses

A liquid containing a salt including oxygen acid radical of nitrogen in an amount exceeding a salt including carbonic acid radical dissolved in the liquid-including substance.

A catalyst is also present comprised of palladium and rhodium(col. 6, lines 10-17; col. 10, lines 11-15).

The catalyst is operated at a temperature of 300 °C(col. 12, lines 7-12).

The catalysts are useful for treating exhaust gases, which include nitrogen oxides, and

The catalyst is used for automotive combustion catalysts, therefore it is used with a vehicle(col. 1, lines 13-16).

But, in the disclosing of the cited reference, the process for preparing the Durand et al. catalyst is comprising:

A step(a), A step(b), A step(c).

A step(d) in which said coated substrate is calcined.

A step(e)

A step(f) in which said coated, calcined, and impregnated substrate resulting from step(e) is heat-activated(see Durand et al. col. 2, lines 14-55)

Therefore, it would have been obvious to one of ordinary skill in the art that Durand et al. disclosed a solid catalyst and a process for preparing the solid catalyst and the aqueous solution comprised of cerium compounds is a solution of precursor salt of cerium oxides in the solid catalyst, thus the precursor is not used for treating a exhaust gas as it is.

These situations are made clearer by example 10, example 17 and table 2 in the reference(see Durand et al. col. 9, 55-col. 10, 23; col. 12, 49-61; col. 13 table 2).

In the reference, an aqueous suspension containing 50g of barium carbonate, 400g of cerium oxide (CeO_2) (a cerium nitrate solution), and others is cured, ground, dried and dispersed in water to a suspension. A metal monolith is coated with said suspension and calcined at 600°C. and is impregnated with a solution of palladium nitrate and rhodium nitrate. After being dried and calcined for 2 hours at 500°C, the catalyst is subjected to a reducing treatment carried out for 30

minutes at 500°C. The Composition of said catalyst is as follows.

Composition of the catalyst (% by weight) (Durand et al col.13, table 2)					
Example	CeO ₂	Fe ₂ O ₃	SiO ₂	BaO	Metals(Pd/Rh)(g/l)
10	13.3	1.67	0.64	1.3	2.1
note 1 The alumina content corresponds to the difference at 100%.					
note 2 Fe ₂ O is error.					

Thus, this shows that the Durand et al. catalyst has a solid composition and the cerium nitrate solution and others are used as precursors. Being calcined the aqueous solution of cerium nitrate etc to oxides like cerium oxide, any water is not included in the Durand et al. catalyst as a liquid. And the oxides have very high melting point higher than 1500 °C, thus, any molten liquid is not included in the catalyst at a temperature between 300 and 550 °C at which the effectiveness of the Durand et al. catalyst is measured(col.12, lines 6-12).

Therefore, the treatment of exhaust gas in the presence of liquid-including substance is not described in the reference. "A liquid-including substance installed in a passage of the exhaust gas" is not disclosed in the cited reference in which the catalyst is prepared by calcination to a solid catalyst using precursor salt solutions. (see Durand et al. col.1, lines 56-62, col.2, lines 14-55, col.3, lines 3-23).

In the invention, a liquid-including substance is installed in the exhaust gas passage from the exhaust gas emission source capturing the carbon-containing particles by liquid surface of the liquid-including substance and reacting with the salts including oxygen acid radical of nitrogen to form reaction products with the carbon-containing particles, for example, the salts including carbonic acid radical. Thus said liquid-including substance having the salts including carbonic acid radical absorbs and reacts with the nitrogen oxides in the exhaust gas to produce the salt including oxygen acid radical of nitrogen, consequently, recover its ability to react with the carbon-containing particles resulting in both decrease of nitrogen oxides and carbon-containing particles of the exhaust gas. (see the specification, page 3, line 6-12). The liquid-including substance in the invention has at least partially liquid surface and can adhere to capture carbon-containing particles in the conditions of the invention. (see the specification, page 4, lines 8-10).

To make these situations clearer about the matter, claim 1 and claim 18 have

been amended. By these amendments, the claims shall distinctly claim the subject matter which the applicant regard as the invention.

Claims 2, 4, 7, 13, 14 and 20 depend on said amended claim 1, consequently, claims 2, 4, 7, 13, 14 and 20 are considered to have been amended simultaneously.

Claim Rejections 35 U.S.C. 103

Claims 3, 5 and 6 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Durand et al. (US Patent 5,965,481) in view of Kurokawa et al. (US Patent 6,420,306 B2).

The examiner has suggested that Kurokawa et al. teaches;

A purifying catalyst comprised of barium carbonate and a barium nitrate, along with a palladium nitrate solution, wherein the barium is in the form of a solid barium compound (col. 4, lines 23-65).

The barium compound is essential in absorbing nitrogen oxides (col. 9, lines 36-47).

The examiner has suggested that the modification of the teachings of Durand et al. based on the teachings of Kurokawa et al. would have been obvious to one of ordinary skill in the art, because one of ordinary skill in the art, would have expected a process for treating exhaust gases with a liquid solution comprised of a carbonate and nitrate as taught by Kurokawa et al. to be similarly useful and applicable to a process for treating exhaust gases with a liquid substance comprised of carbonate and nitrate radicals as taught by Durand et al.

But, these are contrary to the fact, because Kurokawa et al. disclosed;

A catalyst with a under and over catalyst layers formed by wash-coating a slurry comprised of several compounds including the barium compounds mixed with water on a carrier, drying the coating at for 150°C. for two hours and burning the coating at 500°C. for two hours (see Kurokawa et al. col. 7, lines 5-29).

Therefore, it would have been obvious to one of ordinary skill in the art that Kurokawa et al. disclosed catalyst is a solid catalyst and the slurry or solution is not used for treating exhaust gases as it is, and there is not any description of molten liquid in the reference.

Further, Kurokawa et al. teaches that the barium has a strong tendency to be poisoned with water, therefore, the catalyst has a layer containing an agent for absorbing water like zeolite to prevent the water poisoning. accordingly, Kurokawa et al. catalyst has not any liquid surface with a liquid like water (see Kurokawa col. 1, lines 61-64, col. 2, lines 9-41).

Thus, there is neither description nor suggestion in the reference which would lead one of ordinary skill in the art to expect at least partial liquid surface of the liquid-including substance installed in a passage of the exhaust gas, which can adhere to capture and react with carbon-containing particles of the object of the invention. And the situation is not easily anticipated and not obvious to one having ordinary skill in the art.

Claims 3, 5 and 6 are based on the inventors findings about the effectiveness of capturing of carbon-containing particles and removing them from the exhaust gases with the liquid surface of the liquid-including substance of the object of the invention.

Therefore, any case of obviousness which may have been established based on the reference is considered to have been overcome.

For more clearing about the situation, claim 1 has been amended and claims 3, 5 and 6 depend on said amended claim 1, consequently, claims 3, 5 and 6 are considered to have been amended simultaneously.

Claims 8-12 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Durand et al. (US Patent 5,965,481) in view of Golden (US Patent 5,939,354).

The examiner has suggested that Golden teaches;

A perovskite-type metal oxide compounds, and

A method for preparing the compounds, which are useful in reducing nitrogen oxides

The compounds are comprised of an aqueous solution of calcium nitrate tetrahydrate, as well as mixed hydroxide hydrated lanthanide carbonate (col. 7, lines 54-61).

And the examiner has suggested that the modification of the teachings of Durand et al. based on the teachings of Golden would have been obvious to one of ordinary skill in the art, because one of ordinary skill in the art, would have expected a process for treating nitrogen oxides with a liquid substance comprised of nitrate and carbonate radicals as taught by Golden to be similarly useful and applicable to a process for treating exhaust gases comprised of nitrogen oxides wherein a liquid-substance comprised of nitrate and carbonate radicals are utilized as taught by Durand et al.

But, these are contrary to the fact, the compound, namely, a perovskite-type metal oxide compound is a oxide including substantially none of nitrate and none of carbonate radicals, which radicals are burned out to form the perovskite-type metal oxide by calcining at a temperature of 400°C. or higher. (see the reference

col. 6, line 16-17). thus, the compound is a solid oxide compound and not comprised of an aqueous solution of calcium nitrate, as well as mixed hydroxide hydrated lanthanide carbonate. Because the nitrate, carbonate and others are raw materials of the compound. Consequently, "a process for treating nitrogen oxides with a liquid-substance" has not been disclosed in the cited references.

Thus, there is neither description nor suggestion in the references Durand et al. and Golden which would lead one of ordinary skill in the art to expect a process for treating nitrogen oxides with a liquid substance of the object of the invention, therefore the situation is not easily anticipated and not obvious to one having ordinary skill in the art.

Claims 8-12 are based on the inventors findings about the capturing and removing of carbon-including particles by a liquid surface of the liquid-including substance for treating exhaust gases of the object of the invention.

Therefore, any case of obviousness which may have been established based on the reference is considered to have been overcome.

Claims 8-12 depend on claim 1 which has been amended to the amendment, thus claims 8-12 are considered to have been amended as well as amended claim 1.

Claim Objections

Claims 19 and 20 are objected to as being dependent upon a rejected base claim, but the applicant believe that claim 21 should be dealt with here instead of claim 20, because claim 21 is included in the Disposition of claims 7) and claim 20 is included in the Disposition of claims 6) of the Office Action Summary.

Claim 19 have been rewritten in independent form in accordance with the examiners suggestion. Claim 21 depends upon claim 19, thus claim 21 is considered to have been amended as well as claim 19.

Other Cited Rerences

Cambell et al. (US Patent 5,451,558) discloses a catalytic absorber reducing pollutants particularly from a gas turbine. Consequently, Campbell et al. is quite different from the application in the structure and operational advantage.

Guth et al. (US Patent 5,599,758) discloses a process for the regeneration of the devitalized catalyst/absorber after extended exposure to pollutants in the combustion gases of engines. Consequently, Guth et al. is quite different from this application in the object, structure and operational advantage.

Deeba et al. (US Patent 5,874,057) discloses a method of a NO_x abatement comprising contacting a gas stream containing NO_x with a NO_x abatement composition, the composition comprising a NO_x abatement catalyst and a NO_x sorbent material disposed in proximity to each other on a common refractory carrier member. Consequently, Deeba et al. quite different from this application in the structure and operational advantage.

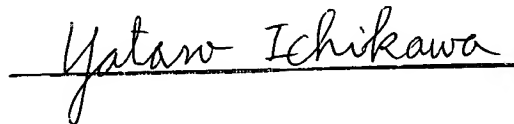
Murayama et al. (US Patent 6,387,138 B1) relates to a process for burning a diesel fuel composition. Consequently, Murayama et al. is quite different from this application in the object, structure and operational advantage.

Koermer et al. (US Patent 6,548,446 B1) discloses a selective catalytic material for selectively oxidizing carbon monoxide. Consequently, Koermer et al. is quite different from this application in the object, structure and operational advantage.

For these reasons, the applicant respectfully submits that the rejection and the objection based on the references should be withdrawn.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of rejection and objection set forth by the examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted

A handwritten signature in cursive script, reading "Yataro Ichikawa", is written over a horizontal line.

Yataro ICHIKAWA

Applicant

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